

CLAIMS

1. A method of producing male or female sterile plants comprising providing means for inactivating a herbicide and means for reactivating the thus inactivated herbicide, wherein the herbicide inactivating means is provided within vegetative tissues and the reactivating means is provided in either the male or female reproductive structures of the plant, so that the vegetative, but not reproductive, structures are protected from the phytotoxic activity of the herbicide when applied to the plant.
- 10 2. A method according to claim 1, wherein the means is an enzyme.
- 15 3. A method of producing male or female sterile plants according to either of claims 1 or 2, comprising the steps of transforming plant material with a polynucleotide which encodes a first enzyme which is capable of N-acetylating L-phosphinothricin and a second enzyme which is capable of hydrolyzing, or otherwise removing the acetyl group from, the N-acetyl L-phosphinothricin to yield L-phosphinothricin, and regenerating the thus transformed material into a plant, wherein the first enzyme is expressed only in the green tissues of the plant and wherein L phosphinothricin herbicide is applied to the plant foliarly up to the time of male or female gamete formation and/or maturation, so that the plant is substantially undamaged by the application of herbicide and wherein the second enzyme is expressed preferentially in either male or female reproductive structures so that the selective local regeneration of L phosphinothricin in these tissues prevents the formation of the said gametes, or otherwise renders them non-functional.
- 25 4. A method according to the preceding claim, wherein the first enzyme is a phosphinothricin acetyl transferase (PAT) and the second enzyme is an amidase or hydrolase.
- 30 5. A method according to any preceding claim, wherein the L-phosphinothricin is applied in mixture along with D phosphinothricin and or at least one further compound selected from the group consisting of safeners, gametocides, glutathione S transferase inducers, Cytochrome P-450 inducers or inhibitors, herbicides, fertilizers,

nematocides, synergists, insecticides, fungicides, hormones and plant growth regulators.

6. A method according to either of claims 4 or 5, wherein the PAT enzyme is under expression control of a plastocyanin promoter.

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7. A method according to any one of claims 4 to 6, wherein the PAT enzyme is additionally expressed from a either a male or female specific floral promoter so that the enzyme is present only in green tissues and in reproductive tissues other than
10 those reproductive tissues in which the gametes are rendered non-functional.